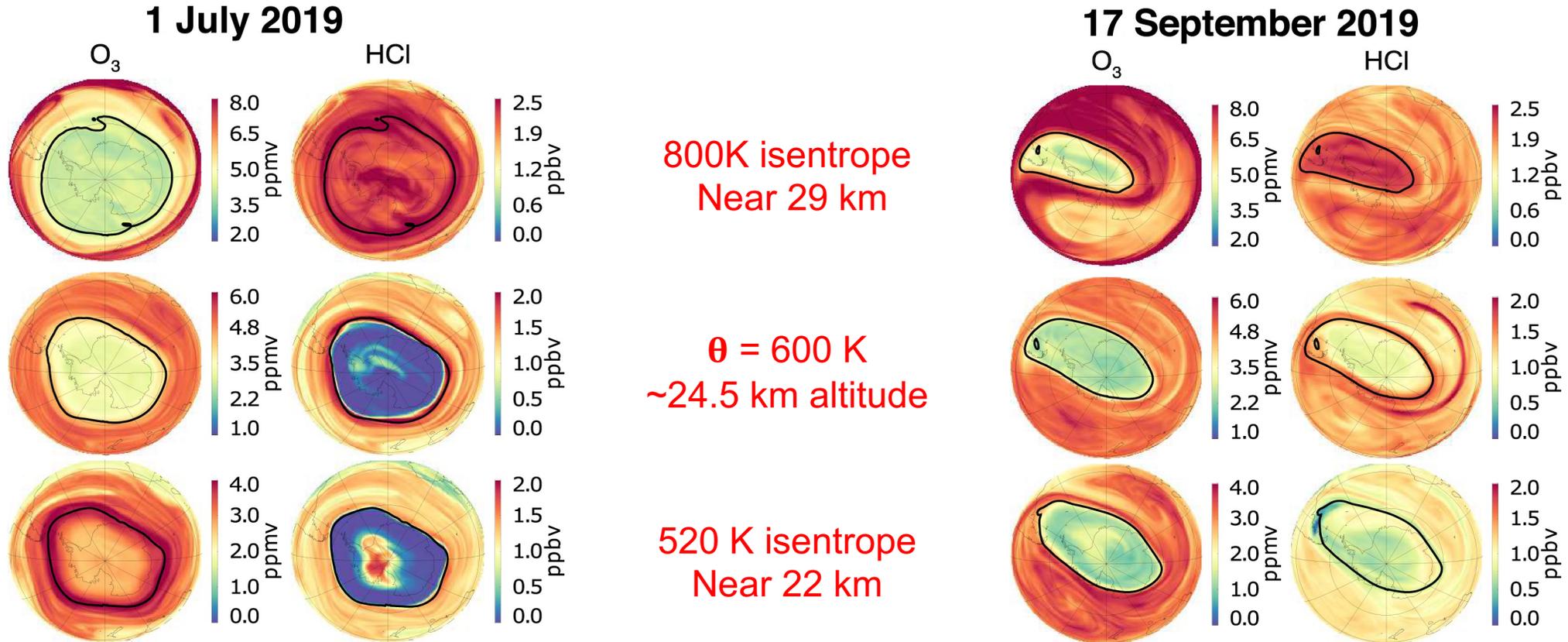


# The Anomalous 2019 Polar Stratospheric Chemistry in GMAO's Assimilation Experiments



Large polar vortex (black contour). Chlorine activation indicated by very low concentrations of the chlorine reservoir compound, HCl at 600 K and below. No significant chemical ozone depletion yet.

Smaller, distorted and displaced polar vortex following the sudden stratospheric warming. Low ozone. Increased HCl signals chlorine deactivation. Evidence of wave breaking.